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DEPARTMENT OF CONSERVATION AND NATURAL RESOURCES
DIVISION OF ENVIRONMENTAL PROTECTION
901 S. Stewart St. Ste. 4001
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JULY 26, 2005

NOTICE OF DECISION

WATER POLLUTION CONTROL PERMIT NUMBER NEV0087001

ANGLOGOLD ASHANTI (NEVADA) CORPORATION

BIG SPRINGS MINE – (Permit Renewal)

The Nevada Division of Environmental Protection (Division) has decided to renew Water Pollution Control Permit NEV0087001, held by AngloGold Ashanti (Nevada) Corporation for the Big Springs Mine. This permit authorizes only the permanent closure of the facility located in Elko County. The Division has been provided with sufficient information, in accordance with Nevada Administrative Code (NAC) 445A.350 through NAC 445A.447, to assure the Division that waters of the state will not be degraded by this operation, and that public safety and health will be protected.

The permit will become effective August 15, 2005. The final determination of the Administrator may be appealed to the State Environmental Commission pursuant to Nevada Revised Statute (NRS) 445A.605 and Nevada Administrative Code (NAC) 445A.407. All requests for appeals must be filed by 5:00 PM, August 10, 2005, on Form 3, with the State Environmental Commission, 901 South Stewart Street, Suite 4001, Carson City, Nevada 89701-5249. For more information, contact Kurt F. Kolbe directly at (775) 687-9405, toll free in Nevada at (800) 992-0900, extension 4670, or visit the Division website at http://ndep.nv.gov/.

Two comment letters were received during the public comment period.

The first comment letter/document, dated March 31, 2005, was received from Great Basin Mine Watch (GBMW). This document format consists of a 'Discussion' section followed by a 'Recommendations' section. The 'Discussion' section focuses on specific mine components and

their actual/potential environmental impacts. The 'Recommendation' section provides seven recommendations "for construction activities which may help prevent continued degradation." NDEP has reproduced selected comments from the 'Discussion' section together with a NDEP response. The seven 'Recommendations' and associated NDEP responses then follow.

The second comment letter, dated March 23, 2005, was received from the Board of County Commissioners, County of Elko. The contents are reproduced, in entirety, below.

APPENDIX A - APPLICABLE NEVADA ADMINISTRAIVE CODE (NAC) contains the complete NAC's referenced in the NDEP responses to comments.

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BOARD OF COUNTY COMMISSIONERS, COUNTY OF ELKO

"Elko County supports the renewal of a water pollution control permit to Anglogold Ashanti (Nevada) Corporation. for the Big Springs Mine. We believe this mine post-closure permit approval will cause minimal impact to the area and will be in keeping with the County Commission's position of wise management of public lands.

Over the years, the mining industry has successfully provided environmentally friendly mining operations that has furnished a base for jobs and taxes in Northeastern Nevada. They have repeatedly shown that they are a responsible component of our community. The mining industry continues to operate in compliance with applicable state and federal environmental requirements in an ever more difficult regulatory climate."

NDEP RESPONSE:

Comment noted.

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GREAT BASIN MINE WATCH - DISCUSSION SECTION

GREAT BASIN MINE WATCH 'DISCUSSION' COMMENT #1:

"The water quality of the two pit lake exceeds standards for TDS and occasionally manganese; they have high sulfate concentrations as well. For example, in the 2nd quarter 2004, TDS concentrations were 1400 and 1000 mg/l, respectively. Because these are flow through systems, it appears that the pit lakes violate downgradient water quality."

NDEP RESPONSE:

In general, mining created pit lakes are regulated by NDEP under *NAC 445A.429 Procedures required to prevent release of contaminants; requirements concerning impoundments*. This regulation requires that pit lake water not adversely affect the health of human, terrestrial or avian life. As provided for in the Fact Sheet (page 3) *"An ecological screening analysis was conducted and predicts no threats to human, avian or terrestrial receptors from pit lake water (ENSR, 1998)."* There are no water quality standards nor designated beneficial uses assigned to these two pit lakes, hence they do not exceed "***…standards for TDS and occasionally manganese;…".***

The pit lakes do not directly ***"… violate downgradient water quality"*** but do appear to provide a mass loading input to the North Fork of the Humboldt River (NFHR). The relative impact of this input (mass of chemical constituents) into the NFHR is not clear (unquantifiable) at this time. One requirement of the renewed Water Pollution Control Permit (WPCP) will be a NFHR FLOW MODEL (see page 17 of the Fact Sheet for details; see also **NDEP RESPONSE** to ***GREAT BASIN MINE WATCH 'RECOMMENDATION' COMMENT #6*** below). This model should help all parties in the determination in the relative tributary/mine component mass inputs into the NFHR.

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GREAT BASIN MINE WATCH 'DISCUSSION' COMMENT #2:

"… Finally, Lahontan cutthroat trout had elevated concentrations in their tissues. Tuttle and Higgins (1998, page 28) summarized that "[s]elenium was of particular concern. As with water, sediment, and invertebrates, selenium in fish tissues exceeded concentrations associated with adverse effects. Selenium concentrations in the majority of fish muscle samples from NFHR also exceeded a recommended criterion for human consumption."

…Based on the Tuttle and Higgins (1998) report, this appears to an erroneous conclusion for at least selenium and possibly other metals. Seepage of selenium and other trace metals have contaminated the river water and sediments. For trace metals, much of the damage occurs when the metals become bound to sediments; they get into the food chain through the macroinvertebrates as documented by Tuttle and Higgins (1998)."

…Tuttle and Higgins (1998) directly contradict NDEP's fact sheet which claims that fish sampling "indicate[s] that mining has not impacted fish nor is there any constituent within fish tissues that would pose a risk through human consumption" (Fact Sheet, page 12)."

NDEP RESPONSE:

The above Tuttle and Higgins report is titled *'Preliminary Assessment of Potential Impacts of Drainage Associated with the Big Springs Mine to Aquatic Organisms in the North Fork Humboldt River, Elko County, Nevada, 1998'.* This USFWS study was limited in scope and not an exhaustive investigation on the Lahontan cutthroat trout (*Onchorynchus clarki henshawi*) in the streams around or near the Big Springs Mine.

Tuttle and Higgins presented NFHR Lahontan cutthroat trout (LCT) sample concentrations selenium (fish muscle) ranging from 1.7 to 2.9 ug/g with a mean of 2.3 ug/g (all wet weight). This data was then entered into a toxic threat hazard ranking system based on a protocol provided by Lemly (1995). The ranking system concluded that these fish tissue selenium concentrations constituted a 'High Hazard'. The definition of the ranking system 'High Hazard' is that the fish 'may be at the risk of adverse effects from selenium'.

An extensive follow-up study to this USFWS draft report was funded by AngloGold and carried out by third-party experts in 1999. The third-party study was carried out in cooperation with NDEP, USFS, Nevada Division of Wildlife (NDOW), and Nevada Bureau of Health Protection Services (NBHPS). The study was designed to review: 1) Lahontan cutthroat trout (LCT) population data; 2) LCT condition; 3) LCT tissue selenium concentration to assess potential human health risk; and 4) sediment chemistry. These data were collected in 1999, analyzed, and published in the report *'Chadwick Ecological Consultants (CEC), Inc, 2000, Fish Population Survey of the North Fork of the Humboldt River, Elko County, Nevada, 1999'* (Chadwick). The Chadwick fish tissue (edible) selenium samples ranged from 0.58 to 1.5 ug/g with a median value of 0.75 ug/g and an average of 0.83 ug/g (all wet weight).

The major conclusions of the report confirmed that there was **no** mining related adverse impacts to the LCT. Additionally, LCT population surveys have been carried out between 1986 and 2002. These data along with the data presented in the March 2000 report and macro-invertebrate data collected over the 1986-2004 time period continue to show no mining related adverse impacts to the LCT or the macro-invertebrate communities.

Additionally, numerous mitigation programs in cooperation with, or under the direction of, the USFS, USFWS and NDOW have been undertaken by AngloGold to improve LCT habitat and water quality in the NFHR. These programs include stream bank stabilization, riparian habitat enhancements, livestock exclusion fencing, LCT spawning habitat improvements, wetland enhancement, and riparian revegetation efforts. AngloGold also completed a land exchange with the U.S. Bureau of Land Management (BLM) in early 1996. This land exchange involved transferring 20.8 miles of the Marys River basin area from private to BLM control. The land exchange documents identified the benefit as follows: “(t)he improvements and expansions of LCT habitat could increase fish populations from an average of 340 to 2500 fish per mile (100-575 catchables) within 10 years. This increase in the fish population could contribute to the eventual delisting of the LCT subspecies in the Humboldt River Basin as a threatened species.”

In a related matter, recently the EPA has proposed, in the document *'Draft Aquatic Life Water Quality Criteria for Selenium - 2004',* an updated aquatic life water quality criteria for selenium. Due to the bioaccumulative properties of selenium, the new criteria would be expressed as a concentration of the pollutant in fish tissue rather than the current concentration in the water. The proposed draft freshwater aquatic life chronic criterion states that:

'The concentration of selenium in whole-body fish tissue does not exceed 7.91 µg/g dw (dry weight). This is the chronic exposure criterion. In addition, if whole-body fish tissue concentrations exceed 5.85 µg/g dw during summer or fall, fish tissue should be monitored during the winter to determine whether the selenium concentration exceeds 7.91 µg/g dw.'

This proposed action would not change the EPA human health criterion and fish advisory values. The EPA draft Criteria document provides a equation for converting 'whole-body' tissue to 'edible tissue' ([whole body]=exp(0.13+0.89ln[edible tissue]). An equivalent 'whole-body' value of 7.91 ugSe/g (dw) would convert to 8.80 ugSe/g 'edible tissue' (dw). In general, selenium concentrations in tissues based on 'dry weight' may be converted to 'wet weight' using a moisture content of 0.80%. Therefore, the proposed 7.91 µgSe/g (dw) criteria, converted to an 'edible tissue' value (8.80 ugSe/g dw) would equate to 1.8 µgSe/g as 'wet weight'.

Although all of the earlier Tuttle and Higgins LCT sample selenium concentrations (range - 1.7 to 2.9 ug/g; mean - 2.3 ug/g - all wet weight) would have exceeded the proposed criteria, none of the later Chadwick samples (range - 0.58 to 1.5 ug/g) would have.

The statement that "***Selenium concentrations in the majority of fish muscle samples from NFHR also exceeded a recommended criterion for human consumption"*** is based on a single technical document (*Fan, et al. (1988). 'Selenium and human health implications in California San Joaquin Valley. J. Toxicol. Environm. Health 23:539-559*) which concluded that a 'recommended criteria for human consumption' of fish should contain no more than 2.0 µgSe/g (wet weight) in the edible fish tissue.

Currently, the EPA has set the screening value (SV) for selenium in edible fish tissue at 20 mg/kg (µg/g) wet weight. (*Source: Guidance for Assessing Chemical Contaminant Data for Use in Fish Advisories Volume 1: Fish Sampling and Analysis - Third Edition, EPA 823-B-00-007 Environmental Protection (4305) November 2000*). Screening values are defined as concentrations of target analytes in fish or shellfish tissue that are of potential public health concern and that are used as threshold values against which levels of contamination in similar tissue collected from the ambient environment can be compared. Exceedance of these SVs should be taken as an indication that more intensive site-specific monitoring and/or evaluation of human health risk should be conducted.

The State of Nevada does not currently have, nor has ever had, a screening level value for selenium in fish tissue. However, the Bureau of Environmental Health and Safety (BEHS), Division of Health, Idaho Department of Health and Welfare, in cooperation with the federal Agency for Toxic Substances and Disease Registry (ATSDR), conducted a Health Consultation in SE Idaho to assess potential fish consumption issues related to elevated selenium in the

surface waters (*Selenium in Fish Streams of the Upper Blackfoot River Watershed - Southeast Idaho Selenium Project - Soda Springs, Caribou County, Idaho - May 15, 2003*). Among the study results was a selenium in fish risk assessment consumption table provided below:

Table 1. General risk assessment assumptions and action levels for selenium in fish

Population	**General Population**	**Pregnant Women[a]**	**Children[b]**
Body Weight (kg)[c]	80	70	20
Meal Size Uncooked (oz)[d]	8	8	4
Screening Values of Selenium in Fish (mg/kg) [e]	**6.2**	**5.4**	**3.1**

a: pregnant women, women who may become pregnant, and nursing mothers
b: children less than 7 years old
c: adjusted from Idaho Behavioral Risk Factors (BVRHS, 2001)
d: 1 oz = 0.0283 kg; 8 oz = 0.2268 kg
e: Reference dose of selenium is 0.005 mg/kg/day (EPA)

It may be noted that the Fan, et al selenium concentration value of 2.0 ug/g, as a 'recommended criteria for human consumption' level, included data from marine sources. With respect to the LCT in the NFHR, a more representative empirical screening value for selenium in edible fish tissue could be expected from the Idaho data (freshwater data only).

The current values of selenium in edible fish tissue (LCT) collected from the NFHR are well below both the EPA screening level and the Idaho consumption guidelines presented above. Neither Federal nor State of Nevada agencies have ever issued a Fish Consumption Health Advisory/ Safe Eating Guideline with respect to selenium levels in LCT in the NFHR. The Fact Sheet (page 12) statement that "*The results of this sampling program indicate that mining has not impacted fish nor is there any constituent within fish tissues that would pose a risk through human consumption"* would appear to be correct.

In the future however, should Federal or State selenium (or any other constituent of concern) guidelines change, with respect to all NFHR water quality standards and designated beneficial uses, the WPCP will be modified to reflect the current standard.
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GREAT BASIN MINE WATCH 'DISCUSSION' COMMENT #3:

"The Fact Sheet notes that selenium has recorded increases of pre-mining background conditions in surface waters. It also notes that tributaries are the primary source in NFHR (Fact Sheet, page 11). It therefore appears that pollution from the mines and waste rock at Big Springs has caused potentially toxic conditions at some points in the NFHR."

NDEP RESPONSE:

As provided for by *NAC 445A.110 "Toxic material" defined*, a 'toxic material' means any pollutant or combination of pollutants which will, on the basis of information available to the Administrator, cause an organism or its offspring to die or to suffer any; disease; behavioral abnormality; cancer; genetic mutation; physiological malfunction, including a malfunction in reproduction; or physical deformation, if that pollutant or combination of pollutants is discharged and exposed to or assimilated by the organism, whether directly from the environment or indirectly through food chains.

NAC 445A.121 Standards applicable to all surface waters (4) contains statewide narrative criteria requiring waters be free from toxics. Numeric criteria for toxic materials which apply to class and designated waters (and may apply to other waters as provided by the 'tributary rule' under *NAC 445A.145 Control points: Prescription and applicability of numerical standards for water quality; designation of beneficial uses*) are contained in *NAC 445A.144 Standards for toxic materials applicable to designated waters* and 40CFR 131.36. *NAC 445A.144* provides specific water quality numeric 'threshold' standards, for state recognized 'toxic materials', to four statewide designated beneficial uses: municipal/ domestic water supply; aquatic life; irrigation; and watering of livestock. Nevada relies on EPA criteria when establishing numeric water quality standards for toxics. For these beneficial uses, numeric standards are based on ambient water quality criteria published by USEPA. Historically, numeric criteria contained in *NAC 445A.144* for the protection of municipal and domestic water supply were based on maximum contaminant levels (MCLs) which have been adopted by the Nevada Board of Health as standards for drinking water.

The state of Nevada considers selenium to be a 'toxic material'. With respect only to selenium, below are those *NAC 445A.144* specific water quality numeric 'threshold' standards, footnotes, and references applicable to the four statewide designated beneficial uses listed above:
'…

Chemical	Municipal or Domestic Supply (µg/l)	Aquatic Life (µg/l)	Irrigation (µg/l)	Watering of Livestock (µg/l)
….				
Selenium	50[b] -		20[d]	50[d]
1-hour average	-	20[a]	-	-
96-hour average	-	5.0[a]	-	-

Footnotes and References
…
(5) The standards for metals are expressed as total recoverable, unless otherwise noted.
…
a. U.S. Environmental Protection Agency, Pub. No. EPA 440/5-86-001, *Quality Criteria for Water* (Gold Book) (1986).
b. Federal Maximum Contaminant Level (MCL), 40 C.F.R. §§ 141.11, 141.12, 141.61 and 141.62 (1992).
…
d. National Academy of Sciences, *Water Quality Criteria* (Blue Book) (1972).'

The 'municipal/ domestic water supply' and 'watering of livestock' water quality numeric 'threshold' standards are the same. Historically, there has been one exceedence of this selenium standard above the mining operations in the Sammy Creek drainage (S-101 in 1998) and one exceedence in a tributary below the mining operations (S-115 in 1997). These would appear to be isolated exceedances. Currently the NFHR does not serve as a source of municipal/domestic water supply at S-150 or above. Livestock have been excluded from the mined areas since mining operations began and will probably be excluded during much of the post-closure monitoring period.

With respect to the irrigation standard, site S-150 (the most downgradent monitoring station) is located at the boundary between private and public lands. Local ranching has utilized the NFHR at or below S-150 for irrigation practices in the past. Above S-150, the NFHR has not been used, at least within the mining timeframe, for irrigation practices. There has never been a recorded exceedance of the 20 ug/l irrigation value at S-150.

Relatively consistent exceedances of the selenium beneficial use 'Aquatic Life' chronic standards have been an ongoing concern to all parties. As provided by the Fact Sheet, and as referenced by GBMW above - *"The selenium beneficial use 'Aquatic Life' acute (0.02 mg/l) and chronic (0.005 mg/l) standards are provided for within NAC 445A.144. Elevated levels (most present in the dissolved form) above the chronic, and occasionally acute, standard are continuing to be recorded in all three tributaries (S-110, S-115, and S-120) to the NFHR. Neither standard was ever exceeded in the two NFHR monitoring stations above the mine (S-95 and S-100). Station S-101 (Sammy Creek) has, however, recorded exceedances of the chronic standard. Tributary input is considered the selenium source responsible for the NFHR chronic standard exceedances as recorded at S-140. No exceedance of the chronic value have been recorded at S-150 since 2000."* (Fact Sheet, page 11)

As mentioned above, Nevada's numeric water quality standards for toxics are derived from EPA laboratory studies of biological organisms' sensitivity to specific chemicals. In these studies, a variety of fish, benthic macro-invertebrates and zooplankton are exposed to known concentrations of a chemical under varying conditions. In some cases, specific water quality numeric 'threshold' standards are determined from species/conditions unlike those found in the area of the NFHR. *NAC 445A.121* provides that;

'If toxic materials are known or suspected by the Department to be present in a water, testing for toxicity may be required to determine compliance with the provisions of this section and effluent limitations. The Department may specify the method of testing to be used. The failure to determine the presence of toxic materials by testing does not preclude a determination by the Department, on the basis of other criteria or methods, that excessive levels of toxic materials are present.'

The Fact Sheet (page 12) provides the following conclusion; *"Elevated selenium values, as discussed above, have exceeded the aquatic life standard provided for within NAC 445A.144. Due to the presence of the threatened Lahontan Cutthroat trout in the NFHR, a mine-sponsored biological monitoring program was developed and implemented in 1986 for both fish and macro-invertebrates. Fish have been assessed as to the type and population on an annual to tri-annual basis since 1986. Fish tissue samples have also been analyzed. The results of this sampling program indicate that mining has not impacted fish nor is there any constituent within fish tissues that would pose a risk through human consumption. The macro-invertebrate communities have also been assessed as to type and population, also beginning in 1986. Depending on the flow regime, yearly macro-invertebrate assessments (with one to three sample events) have been conducted. Results also indicate that mining has had no detrimental effects on this community."*

The AngloGold LCT study, mentioned above in the **NDEP RESPONSE** to the ***GREAT BASIN MINE WATCH 'DISCUSSION' COMMENT #2***, as well as macro-invertebrate data collected over the 1986-2004 time period have provided significant empirical data demonstrating, at this time, that no selenium induced conditions exist that would cause *'…an organism or its offspring to die or to suffer any: disease; behavioral abnormality; cancer; genetic mutation; physiological malfunction, including a malfunction in reproduction; or physical deformation, if that pollutant or combination of pollutants is discharged and exposed to or assimilated by the organism, whether directly from the environment or indirectly through food chains…*' as provided for by *NAC 445A.110*. In addition, these ongoing studies and water quality monitoring have not, at this time, identified any other *NAC 445A.144* identified 'toxic material' has having an impact on aquatic life.

With respect to potential toxic conditions existing in the future, the WPCP does require continued aquatic communities monitoring. In the future, should a Federal or State NFHR related water quality standard, designated beneficial use, or 'toxic material' (or any other constituent of concern) guideline change, the WPCP required monitoring will be modified to reflect the current standard.

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GREAT BASIN MINE WATCH 'DISCUSSION' COMMENT #4:

"As documented above, constituent concentrations from these streams far exceed the beneficial use standards; this degradation caused the tributaries to be added to the state's 2002 303d list of impaired waters…The NFHR for total dissolved solids.

Tributaries Dry Creek, Sammy Creek and Water Canyon Creeks are listed for selenium and TDS, arsenic, selenium and TDS, and selenium and TDS, respectively."

NDEP RESPONSE:

Section 303(d) of the Clean Water Act requires that States develop a list of water bodies needing additional work beyond existing controls to achieve or maintain water quality standards. This list, referred to as the Section 303(d) List, provides a comprehensive inventory of water bodies impaired by all sources, including point sources, nonpoint sources, or a combination of both. The 303(d) List is the basis for targeting water bodies for watershed-based solutions, and the Total Maximum Daily Load (TMDL) process provides an organized framework to develop these solutions. The criteria for listing were developed to identify only those water body segments for which there is adequate documentation that beneficial uses are not being supported and water quality standards are not being met.

With respect to the 303(d) TMDL process for those NFHR/tributary impacted segments, the state has assigned all listed segments the lowest priority. The rationale for the lowest TMDL process priority is that overall increase in TDS and selenium, in both the 303(d) listed segments and the NFHR upper watershed (mined areas) as a whole, have not impaired any designated beneficial use. This was also stated in the Fact Sheet (page 12) *"Past and present water quality data collected from the eight surface water monitoring sites located on the NFHR and tributaries indicate that mining related impacts to the NFHR have not impaired any designated beneficial use…".* (See also the **NDEP RESPONSES** to the ***GREAT BASIN MINE WATCH 'DISCUSSION' COMMENT'S #2, #3, #5, and #6*** for more detail on potential mine related beneficial use impacts to the NFHR.)

As a note, arsenic, listed in the 303(d) report as '*Sammy Creek - above waste rock (upstream of Big Springs Mine'*, is considered by the NDEP to be naturally occurring.

The Water Pollution Control Permit monitoring requirements include TDS, selenium, and arsenic. Both the monitoring frequency and analytical format are designed with thought to future TMDL development.

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GREAT BASIN MINE WATCH 'DISCUSSION' COMMENT #5:

"The NFHR also does not meet beneficial use standards for TDS. The specifications are "≤500 mg/l or one-third above that characteristic of natural conditions (whichever is less)" (NAC 445A.123.3). As documented above, TDS increases more than 1/3 of its upstream concentration through the mine site. For example, in 3rd quarter 2004, TDS increased from 98 mg/l at S-100 to 380 mg/l at S-150, an increase of much more than 1/3. The monitoring does not include S-140 which exhibited higher concentrations than S-150 in some of the studies reported above and perhaps better documents the

failure of the NFHR to meet beneficial use standards. Site S-150 has more flow which dilutes some of the concentrations previously observed at S-140."

NDEP RESPONSE:

The Total Dissolved Solids (TDS) specification ***"≤500 mg/l or one-third above that characteristic of natural conditions (whichever is less)"*** is a Class A water quality standard as provided for within *NAC 445A.124 Class A waters: Description; beneficial uses; quality standards.*

This TDS specification actually consists of two standards. The second value "*...**or one-third above that characteristic of natural conditions (whichever is less)"*** is not directly related to any of the seven assigned Class A beneficial uses as provided for by *NAC 445A.124* (municipal or domestic supply, or both, with treatment by disinfection only, aquatic life, propagation of wildlife, irrigation, watering of livestock, recreation including contact with the water and recreation not involving contact with the water).

The value, ***"≤500 mg/l",*** is related to the current state of Nevada drinking water standards as provided for in the PUBLIC WATER SYSTEMS regulations (NAC 445.450 to 445A.492 inclusive). The TDS standard (500 - 1,000 mg/l), contained in *NAC 445A.455 Secondary standards: General requirements; public notice*, is applicable only to 'public water supplies' or 'systems'. An exceedance of the lower value (***≤500 mg/l)***, as provided for within *NAC 445A.455* requires that;

'Whenever any of the following chemical substances, as measured at representative points in the distribution system, is present in a public water supply in excess of the listed levels, and the health authority determines that there is another more suitable supply of water which is economically feasible, available in a sufficient quantity, and of a significantly higher quality, the supplier of water shall give notice to the public:'

Water containing 500 mg/l of TDS is still potable and available to the public. However, a public water supplier may not provide drinking water with TDS in excess of 1,000 mg/l without treatment or a variance (*NAC 445A.455)*
On page 11 of the Fact Sheet is Table 1 (provided below) illustrating past and present TDS/sulfate values in the area's surface waters.

TABLE 1. TDS/(SULFATE) VALUES (all approximate annual average values in mg/l unless noted)

SURFACE WATER MONITORING STATION	**PRE-MINING VALUES** **Data collected on or before 1987** **(note - only very limited data available)**	**POST MINING VALUES** **1997 - 2004**
	TDS ***(SULFATE)***	**TDS (*SULFATE*)**

S-95	15	<10	50	10
S-100	15	<10	75	10
S-101	(Monitoring began in 1992)		110	20
S-110	*65 (as SC)	<30	570	350
S-115	(Monitoring began in 1991)		2500	1500
S-120	70	<20	1300	1000
S-140	*75 (as SC)	<20	Data not collected	
S-150	*120 (as SC)	<20	320	160

*Schafer and Associates, 1996.

Several considerations were taken into account when NDEP stated in the Fact Sheet (page 11) that;

"A review of the NFHR water quality data indicates that mining impacts have not caused an exceedance of any applicable Drinking Water Standard."

1. *NAC 445A.455* assesses the compliance with a secondary standard *'as measured at representative points in the water system, in a public water supply'.* Currently, there are no public water suppliers located in the reaches/watershed area of the NFHR as contained within this WPCP.

2. The utilization of in-stream water quality data to assess compliance with a secondary drinking water standard or domestic or municipal beneficial use is not consistent with *NAC 445A.455*.

3. Above the control point at S-150, all land within the NFHR mined areas is property of the U.S. administered by the USFS. Future human development requiring a public water supply, above S-150, is unlikely at this time.

4. Should development occur above S-150, The class A waters description of "*waters located in areas of little human habitation, no industrial development or intensive agriculture and where the watershed is relatively undisturbed by man's activity.*" *(NAC 445A.124 Class A waters: Description; beneficial uses; quality standards).* may not be applicable.

5. At the control point S-150, private property is available. It is conceivable that a public water supply could by developed. As provided for in ***TABLE 1. TDS/ (SULFATE) VALUES*** above, the post-mining TDS values, on average, within the monitoring stations on the NFHR meet both lower and upper standards for TDS (500 - 1,000 mg/l). Only on the tributaries (S-110, S-115, S-120) is the upper drinking water standard for TDS (1,000 mg/l) exceeded.

6. The development of municipal supplies from surface waters in the NFHR tributaries is highly unlikely due to their seasonal ephemeral or low flow conditions. In addition, the uncertainty of acquiring surface water rights, and present land use policies (e.g., grazing, recreation, mining, etc) may conflict with surface water supply watershed management practices required for water quality control.

The Fact Sheet (page 10) states;

"The Class A Total dissolved solids standard has been exceeded, at times, in all sampling sites around and downstream of the mined areas…Sulfate is a major component of the TDS calculation and is the constituent that has caused the overall TDS increases."

This statement is correct only with respect to the TDS specification/standard "*...**or one-third above that characteristic of natural conditions (whichever is less)".*** However, as stated above, this standard is not directly related to any of the seven assigned Class A beneficial uses as provide for by *NAC 445A.124*.

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GREAT BASIN MINE WATCH 'DISCUSSION' COMMENT #6:

"NDEP apparently ignores the tributaries however, in its consideration of beneficial use standards. Water Canyon, Dry and Sammy Creek are also class A waters (NAC445A.124.4)."

"NDEP claims that beneficial use standards on the NFHR have not been violated. The beneficial uses are municipal/domestic water supply, aquatic life, propagation of wildlife, irrigation, and livestock watering."

NDEP RESPONSE:

NDEP has not ignored tributaries in its analysis of the potential mining related impacts to the beneficial use standards. Control points are locations where water quality criteria are specified *(NAC 445A.145 Control points: Prescription and applicability of numerical standards for water quality; designation of beneficial uses).* The national forest boundary (also the location of monitoring station S-150) is a control point. The NFHR, from its origin to the national forest boundary, is a Class A water *(NAC 445A.124 Class A waters: Description; beneficial uses; quality standards).* The NFHR, below the national forest boundary, is a Class B water *(NAC 445A.125 Class B waters: Description; beneficial uses; quality standards). NAC 445A.145* requires that standards for water quality and the designated beneficial uses apply to all surface waters in the watershed upstream from the control point or to the next upstream control point or to the next separate water body. There are no control points or next waters upstream of the national forest boundary, therefore all NFHR upstream watershed tributaries are considered Class A waters subject to Class A standards for water quality and designated of beneficial uses **(**This association is commonly referred to as the **'**tributary rule').

The seven beneficial uses of Class A waters are: **municipal or domestic supply, or both, with treatment by disinfection only; aquatic life; propagation of wildlife; irrigation; watering of livestock; recreation including contact with the water; and recreation not involving contact with the water** (*NAC 445A.124 Class A waters)*

With respect to impacts to these seven beneficial uses, the NDEP has concluded that *"Past and present water quality data collected from the eight surface water monitoring sites located on the NFHR and tributaries indicate that mining related impacts to the NFHR have not impaired any designated beneficial use…"* (Fact Sheet, page 12). This presently is still the conclusion of NDEP.

For reference, below is a table listing the seven Class A water designated beneficial uses; all known mining related constituents of concern that have the potential to impair one or more of the beneficial uses; and the location within this NOD where a discussion is provided (in general, applicable Fact Sheet comments are also provided within the NDEP RESPONSES).

CLASS A WATERS BENEFICIAL USES	**CONSTITUENT OF CONCERN (NOD discussion location)**
Municipal or domestic supply, or both, with treatment by disinfection only	***Selenium, TDS*** (See **NDEP RESPONSES** to ***GBMW 'DISCUSSION' COMMENTS #4* and # *5)***
Aquatic Life	***Selenium*** (See **NDEP RESPONSES** to ***GBMW 'DISCUSSION' COMMENTS #2, #3,* and #*4)***
Watering of Livestock	***Selenium*** (See **NDEP RESPONSE** to the ***GBMW 'DISCUSSION' COMMENT # 3)***
Irrigation	*Selenium* (See **NDEP RESPONSE** ***to the GBMW 'DISCUSSION' COMMENT # 3)***
Propagation of Wildlife	***Selenium*** (See **NDEP RESPONSES** to ***GBMW 'DISCUSSION' COMMENTS #2, #3,* and #*4)***
Recreation including contact with the water	*Assuming **Selenium** in relation to Human consumption of LCT* (See **NDEP RESPONSES** to ***GBMW 'DISCUSSION' COMMENTS #2* and #*3)***

Recreation not involving contact with the water	No potential impacts identified

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GREAT BASIN MINE WATCH – RECOMMENDATION SECTION

GREAT BASIN MINE WATCH 'RECOMMENDATION' #1:

Improve the reclamation of the waste rock by adding a true water balance barrier over the top of the dumps to prevent seepage.

NDEP RESPONSE:

Before responding to any specific recommendations or suggested future reclamation/ remediation activities within the mined areas of the NFHR watershed, the NDEP provides the following general guidelines:

1. Minor activities such as localized revegetation activities, remaining road reclamation, general/minor maintenance of diversion ditches and noxious weed removal are encouraged.

NDEP is not excluding any major activity/solution to a 'problem area'.
However, any proposed major reclamation/remediation effort must be well supported with data.

As provided in the Fact Sheet (page 12) *'At this time, the NDEP believes that giving these reclamation/closure activities, to include revegetation of many of the components, time to take effect is reasonable. This post-closure monitoring program of these upper mined areas is designed both to identify areas/ components that are not responding to past reclamation/closure practices and to identify successful mine closure practices. Should an area not demonstrate success, the operator may be required to act.'*

With respect to the recommendation to add ***"…a true water balance barrier over the top of the dumps to prevent seepage"***, it should be recognized that the reclamation and closure methods implemented to date have been designed to minimize the interaction of waste rock and water. Reclamation and closure activities have been closely coordinated with the USFS and NDEP. A key element of RDA closure is the re-establishment of the vegetation community. The vegetation community is an integral component to the water balance and may reduce a significant fraction of the seasonal water through evapo-transpiration. The full development of a mature vegetation community is in progress. While some current RDA vegetation communities meet the standard for bond release, further expansion and maturation of the vegetation assemblages will continue to improve the water balance properties of the RDAs. Also, natural improvement of the growth medium cover (through organic enrichment and the increasing fraction of finer material through weathering of the coarser oxidized material in the cover) will

improve the water balance properties of the cover material on the RDAs. All parties are aware that the RDA's provide a source of the higher TDS, sulfate, and selenium values as compared to the receiving North Fork of the Humboldt River. What's not clear is the overall mass loading effect of the RDA's, or any other mining component, on the NFHR. The permit required NFHR FLOW MODEL will help in quantifying the mine related mass loading to the NFHR. See the **NDEP RESPONSE** to the ***GREAT BASIN MINE WATCH 'RECOMMENDATION' #6*** below for more detail.

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GREAT BASIN MINE WATCH 'RECOMMENDATION' #2:

It is time to correct an original construction omission. The stream flows into the waste rock must be diverted to minimize a primary source of water for oxidation and seepage.

NDEP RESPONSE:

Waste rock (RDA) diversion channels, totaling approximately 9,750 linear feet, have been constructed at the Big Springs mine site. These diversions minimize the interaction of water and waste rock and are an integral component of the final closure plan. It is thought that these diversions redirect the great majority of up gradient stream flows around the waste rock. Any remaining stream flow entering into the base of a RDA would appear only to be in contact with a very limited amount of total RDA material. See the **NDEP RESPONSES** to the ***GREAT BASIN MINE WATCH RECOMMENDATIONS' #1*** and***#6*** for additional detail.

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GREAT BASIN MINE WATCH 'RECOMMENDATION' #3:

Some of the waste rock should be moved to backfill the open pits to eliminate the pit lakes. This will remove some of the source of oxidation from the existing piles. If it ends up beneath the groundwater level, the waste rock should experience anoxic conditions which should minimize the oxidation. This would also counter the downgradient degradation of groundwater being caused by the seepage of water from the pits.

NDEP RESPONSE:

The volume of water in the 303 and SWX surface mines totals about 265 acre-feet based on the mine topography and the average water level. The mass of rock required to backfill the surface mines would be about one million tons (using conversion of 12.4 ft^3/ton). The Sammy Creek RDA contains 4.5 million tons and the Dry Canyon RDA contains at least 9 million tons. Based on these volumes, the backfilling of the SWX and the 303 surface mines would have negligible effect on the volume of rock in the RDAs. This shortfall in tons is because the mines removed a large portion of their volume above the water table.

The pit lakes themselves are not considered a significant source/generator of constituents of concern (anoxic conditions below surface). For example, the source of the majority of sulfate existing in the flow-through pit lakes is likely seasonally watered/dewatered wallrock plus upgradient groundwater containing sulfate from past upgradient activities – all unquantifiable at this time. In addition, backfilling the pit lakes will not preclude this upgradient groundwater movement, now through the RDA backfill, towards the NFHR – the natural groundwater gradient.

In addition, the disturbance required to implement a backfill program for the 303 and SWX pits would entail re-construction of the Dry Canyon Haul Road. This road would have to cross the NFHR and Sammy Creek. These crossings were removed in 1998 and 2000, respectively, reclaimed to the approximate original conditions and stream function.

In summary, at this time it would appear that backfilling the 303 and SWX surface mines would provide little or no concomitant environmental benefit, and in fact probably cause more harm to the environment i.e. re-exposed RDA materials; disposal of 265 acre feet of existing pit lake water plus infiltration during backfill operations, in addition to the above re-construction activities.

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GREAT BASIN MINE WATCH 'RECOMMENDATION' #4:

Once the pits are backfilled, the diversion wells, MW-2 and MW-2a could be plugged and the discharge to Sammy Creek ceased. Even though this discharge may seep into the channel at the discharge point, the increased flow further downgradient suggests that it does have a surface expression (contrary to statements in the fact sheet).

NDEP RESPONSE:

Presuming that the 303 and SWX surface mines could be backfilled, MW-2 and MW-2a could be plugged after backfilling, but the potential for seepage from the backfilled mines (to the slope below the SWX surface mine) at the same elevation as the embankments still exists. There is nothing to contain the seepage in high water level periods unless the engineered embankments are raised within (and under) the suggested backfill. The rates from MW-2 and MW-2a into the surrounding below ground areas are expected to average less than five gallons per minute (gpm). The annual average flow in Sammy Creek at S-110 (1,000 feet downgradient of these wells) is 300 gpm, with peak flows up to 4,200 gpm. The peak flows from the wells will be contemporaneous with the peak flows in Sammy Creek. No increase in flow will be discernable.

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GREAT BASIN MINE WATCH 'RECOMMENDATION' #5:

"This mine requires a NPDES permit. The waste rock creates a surface discharge to the NFHR through a point source channel below the waste rock dump. Seepage from the pit lakes reaches the river. Both require a discharge permit."

NDEP RESPONSE:

Flows from the RDA's and pit lakes are regulated under this Water Pollution Control Permit. This permit has the authority to oversee all portions of a mining operation **(***NAC 445A.359 "Facility" defined.)* and to require mitigation, if necessary, of any potential sources (*NAC 445A.378 "Source" defined.*)

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GREAT BASIN MINE WATCH 'RECOMMENDATION' #6:

NDEP should be more specific about the requirements for the ground/surface water flow model. What is the goal of the model? What will it be asked to show?

NDEP RESPONSE:

The approach proposed by AngloGold would be a spreadsheet model that will link water quality, flow rates, and loads from control points in the system (sampling stations in the tributaries, in the NFHR, and in monitor wells and spring/seep flows along the NFHR). It is intended to capture the effects of the RDAs (surface water), pit lakes (ground water), and any other identified significant source of constituents/mass to the NFHR. The spreadsheet should highlight losing and gaining reaches of the NFHR, which are likely to represent ground water contributions (or losses) from the mine area (if present). The losing or gaining conditions, if any, are expected to vary seasonally as the NFHR shifts from runoff-dominated conditions in the spring and summer to base flow conditions in the fall and winter. The spreadsheet is intended to capture the effects, if any, of the tributaries and ground water fluxes to the NFHR.

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GREAT BASIN MINE WATCH 'RECOMMENDATION' #7:

Maintain the monitoring at S-101. also, establish monitoring of the springs/seeps along NFHR that are apparently linked to flow from the pit lakes.

NDEP RESPONSE:

The Fact Sheet (page 7) provides the following history of this monitoring station - *'Site S-101 is located in Sammy Creek above all mine disturbance. Monitoring began in 1992. This site has*

established background surface water conditions in Sammy Creek. Background conditions are similar to those as established by stations S-95 and S-100 except for elevated background levels of arsenic and occasionally selenium. As with S-95, monitoring of this site will no longer be required.'

S-101 is above all mined areas. Any increases to mining related constituents of concern as noted at Site S-110 (located in Sammy Creek just above the junction of Sammy Creek with the NFHR and below the Sammy Creek RDA's), or any other monitoring point with a clear connection to mined areas below S-101, will be assumed by NDEP to be related to the Big Springs mined area.

The monitoring of springs and seeps is proposed in the WPCP renewal as 'Any persistent surface expression (wetland/bog/spring) within the mined area will be noted. A field pH and field Specific Conductance (SC) reported as Total Dissolved Solids (TDS), together with photos of the area, shall also be taken.' If the conductivity sample flags an issue, follow-up sampling with an expanded parameter list may be required.